

formulario indispensable

$$(I) \quad a^n a^m = a^{n+m}$$

$$(II) \quad a^{-n} = \frac{1}{a^n}$$

$$(III) \quad \frac{a^m}{a^n} = a^{m-n}$$

$$(IV) \quad (a^n)^m = a^{nm}$$

$$(V) \quad \ln A^n = n \ln A$$

$$(VI) \quad \ln AB = \ln A + \ln B$$

$$(VII) \quad \ln \frac{A}{B} = \ln A - \ln B$$

$$(VIII) \quad \operatorname{sen} x = \frac{1}{\operatorname{csc} x}$$

$$(IX) \quad \cos x = \frac{1}{\sec x}$$

$$(X) \quad \tan x = \frac{1}{\cot x}$$

$$(XI) \quad \tan x = \frac{\operatorname{sen} x}{\cos x}$$

$$(XII) \quad \cot x = \frac{\cos x}{\operatorname{sen} x}$$

$$(1) \quad \frac{dc}{dx} = 0$$

$$(2) \quad \frac{dx}{dx} = 1$$

$$(3) \quad \frac{d(av)}{dx} = a \frac{dv}{dx}$$

$$(4) \quad \frac{d(u+v-w)}{dx} \\ = \frac{du}{dx} + \frac{dv}{dx} - \frac{dw}{dx}$$

$$(5) \quad \frac{d(x^n)}{dx} = nx^{n-1}$$

$$(6) \quad \frac{d(v^n)}{dx} = nv^{n-1} \frac{dv}{dx}$$

$$(7) \quad \frac{d(uv)}{dx} = u \frac{dv}{dx} + v \frac{du}{dx}$$

$$(8) \quad \frac{d\left(\frac{u}{v}\right)}{dx} = \frac{v \frac{du}{dx} - u \frac{dv}{dx}}{v^2}$$

Convenio. toda expresion con exponente fraccionario, equivale a una raiz o, a la inversa, toda raiz equivale a una expresion con exponente fraccionario.
notacion.

$$y' = \frac{dy}{dx}$$

$$u' = \frac{du}{dx}$$

$$(1) y = 5$$

$$y' = \frac{dy}{dx} = \frac{d(5)}{dx} \quad \text{aplicamos (1)}$$

$$y' = 0$$

$$(2) y = (25)^2$$

$$y' = \frac{dy}{dx} = \frac{d(25)^2}{dx} \quad \text{aplicamos (1)}$$

$$y' = 0$$

$$(3) y = 1000$$

$$y' = \frac{dy}{dx} = \frac{d(1000)}{dx} \quad \text{aplicamos (1)}$$

$$y' = 0$$

$$(4) y = a$$

$$y' = \frac{dy}{dx} = \frac{d(a)}{dx} \quad \text{aplicamos (1)}$$

$$y' = 0$$

$$(5) y = b^2$$

$$y' = \frac{dy}{dx} = \frac{d(b^2)}{dx} \quad \text{aplicamos (1)}$$

$$y' = 0$$

$$(6) y = \sqrt{ab}$$

$$y' = \frac{dy}{dx} = \frac{d(\sqrt{ab})}{dx} \quad \text{aplicamos (1)}$$

$$y' = 0$$

$$(7) \ y = \frac{7a}{9b}$$

$$y' = \frac{dy}{dx} = \frac{d}{dx} \left(\frac{7a}{9b} \right) \quad \text{aplicamos (1)}$$

$$y' = 0$$

$$(8) \ y = x$$

$$y' = \frac{dy}{dx} = \frac{d(x)}{dx} \quad \text{aplicamos (2)}$$

$$y' = 1$$

$$(9) \ y = x^2$$

$$y' = \frac{dy}{dx} = \frac{d(x^2)}{dx} \quad \text{aplicamos (5)}$$

$$y' = 2x$$

$$(10) \ y = x^3$$

$$y' = \frac{dy}{dx} = \frac{d(x^3)}{dx} \quad \text{aplicamos (5)}$$

$$y' = 3x^2$$

$$(11) \ y = x^{12}$$

$$y' = \frac{dy}{dx} = \frac{d(x^{12})}{dx} \quad \text{aplicamos (5)}$$

$$y' = 12x^{11}$$

$$(12) \ y = x^n$$

$$y' = \frac{dy}{dx} = \frac{d(x^n)}{dx} \quad \text{aplicamos (5)}$$

$$y' = nx^{n-1}$$

$$(13) y = 5x$$

$$y' = \frac{dy}{dx} = \frac{d(5x)}{dx} \quad \text{aplicamos (3)}$$

$$y' = 5 \frac{dx}{dx} \quad \text{aplicamos (2)}$$

$$y' = 5(1) = 5$$

$$(14) y = ax$$

$$y' = \frac{dy}{dx} = \frac{d(ax)}{dx} \quad \text{aplicamos (3)}$$

$$y' = a \frac{dx}{dx} \quad \text{aplicamos (2)}$$

$$y' = a(1) = a$$

$$(15) y = bx + c$$

$$y' = \frac{dy}{dx} = \frac{d(bx + c)}{dx} \quad \text{aplicamos (4)}$$

$$y' = \frac{d(bx)}{dx} + \frac{d(c)}{dx} \quad \text{aplicamos (3) y (1)}$$

$$y' = b \frac{dx}{dx} + 0 \quad \text{aplicamos (2)}$$

$$y' = b(1) = b$$

$$(16) y = x^{1/2} + 6$$

$$y' = \frac{dy}{dx} = \frac{d}{dx}(x^{1/2} + 6) \quad \text{aplicamos (4)}$$

$$y' = \frac{d}{dx}(x^{1/2}) + \frac{d}{dx}(6) \quad \text{aplicamos (5) y (1)}$$

$$y' = \frac{1}{2}x^{1/2} + 0 \quad \text{aplicamos (II)}$$

$$y' = \frac{1}{2x^{1/2}} \quad \text{aplicamos el convenio}$$

$$y' = \frac{1}{2\sqrt{x}}$$

$$(17) y = ax^2 + bx + c$$

$$y' = \frac{dy}{dx} = \frac{d}{dx}(ax^2 + bx + c) \quad \text{aplicamos (4)}$$

$$y' = \frac{d(ax^2)}{dx} + \frac{d(bx)}{dx} + \frac{d(c)}{dx} \quad \text{aplicamos (3)}$$

$$y' = a \frac{d(x^2)}{dx} + b \frac{dx}{dx} + \frac{d(c)}{dx} \quad \text{aplicamos (5) (2) y (1)}$$

$$y' = a(2x) + b(1) + 0$$

$$y' = 2ax + b$$

$$(18) y = ax^5 - bx^3$$

$$y' = \frac{dy}{dx} = \frac{d}{dx}(ax^5 - bx^3) \quad \text{aplicamos (4)}$$

$$y' = \frac{d(ax^5)}{dx} + \frac{d(bx^3)}{dx} \quad \text{aplicamos (3)}$$

$$y' = a \frac{d(x^5)}{dx} + b \frac{d(x^3)}{dx} \quad \text{aplicamos (5)}$$

$$y' = a(5x^4) - b(3x^2)$$

$$y' = 5ax^4 - 3bx^2$$

$$(19) y = \sqrt{x} \quad \text{aplicamos el convenio}$$

$$y = x^{1/2}$$

$$y' = \frac{dy}{dx} = \frac{d(x^{1/2})}{dx} \quad \text{aplicamos (5)}$$

$$y' = \frac{1}{2} x^{-1/2} \quad \text{aplicamos (II)}$$

$$y' = \frac{1}{2} \frac{1}{x^{1/2}} \quad \text{aplicamos el convenio}$$

$$y' = \frac{1}{2\sqrt{x}}$$

$$(20) \ y = \frac{1}{x} \qquad \text{aplicamos (II)}$$

$$y = x^{-1}$$

$$y' = \frac{dy}{dx} = \frac{d(x^{-1})}{dx} \qquad \text{aplicamos (5)}$$

$$y' = -x^{-2} \qquad \text{aplicamos (II)}$$

$$y' = -\frac{1}{x^2}$$

$$(21) \ y = \frac{1}{x^2} \qquad \text{aplicamos (II)}$$

$$y = x^{-2}$$

$$y' = \frac{dy}{dx} = \frac{d(x^{-2})}{dx} \qquad \text{aplicamos (5)}$$

$$y' = -2x^{-3} \qquad \text{aplicamos (II)}$$

$$y' = -\frac{2}{x^3}$$

$$(22) \ y = \frac{1}{x^{16}} \qquad \text{aplicamos (II)}$$

$$y = x^{-16}$$

$$y' = \frac{dy}{dx} = \frac{d(x^{-16})}{dx} \qquad \text{aplicamos (5)}$$

$$y' = -16x^{-17} \qquad \text{aplicamos (II)}$$

$$y' = \frac{-16}{x^{17}}$$

$$(23) \ y = \frac{1}{x^n} \qquad \text{aplicamos (II)}$$

$$y = x^{-n}$$

$$y' = \frac{dy}{dx} = \frac{d(x^{-n})}{dx} \qquad \text{aplicamos (5)}$$

$$y' = -nx^{-n-1} = -nx^{-(n+1)} \qquad \text{aplicamos (II)}$$

$$y' = \frac{-n}{x^{n+1}}$$

$$(24) \ y = \frac{x^2}{5}$$

$$y = \frac{1}{5}x^2$$

$$y' = \frac{dy}{dx} = \frac{d}{dx}\left(\frac{1}{5}x^2\right) \qquad \text{aplicamos (3)}$$

$$y' = \frac{1}{5} \frac{d}{dx}(x^2) \qquad \text{aplicamos (5)}$$

$$y' = \frac{1}{5}(2x)$$

$$y' = \frac{2}{5}x$$

$$(25) \ y = \frac{x^3}{a+b}$$

$$y = \frac{1}{a+b}x^3$$

$$y' = \frac{dy}{dx} = \frac{d}{dx}\left(\frac{1}{a+b}x^3\right) \qquad \text{aplicamos (3)}$$

$$y' = \frac{1}{a+b} \frac{d}{dx}(x^3) \qquad \text{aplicamos (5)}$$

$$y' = \frac{3x^2}{a+b}$$

$$(26) \ y = \frac{2}{3}x^{1/3}$$

$$y = \frac{dy}{dx} = \frac{d}{dx} \left(\frac{2}{3}x^{1/3} \right) \quad \text{aplicamos (3)}$$

$$y' = \frac{2}{3} \frac{d}{dx} (x^{1/3}) \quad \text{aplicamos (5)}$$

$$y' = \frac{2}{3} \left(\frac{1}{3} x^{-2/3} \right) \quad \text{aplicamos (II)}$$

$$y' = \frac{2}{9^{2/3}}$$

$$(27) \ y = ax^2 + \frac{b}{x^3} + \frac{cx^2}{2} + dx + e$$

$$y = \frac{dy}{dx} = \frac{d}{dx} \left(ax^4 + \frac{b}{x^3} + \frac{cx^2}{2} + dx + e \right) \quad \text{por (4)}$$

$$y' = \frac{d(ax^4)}{dx} + \frac{d(b/x^3)}{dx} + \frac{d(cx^2/2)}{dx} + \frac{d(dx)}{dx} + \frac{d(e)}{dx} \quad \text{aplicamos (3) y (II)}$$

$$y' = a \frac{d(x^4)}{dx} + b \frac{d(x^{-3})}{dx} + \frac{c}{2} \frac{d(x^2)}{dx} + d \frac{dx}{dx} + \frac{d(e)}{dx} \quad \text{aplicamos (5) (2) y (1)}$$

$$y' = a(4x^3) + b(-3x^{-4}) + \frac{c}{2}(2x) + d(1) + 0$$

$$y' = 4ax^3 - \frac{3b}{x^4} + cx + d$$

$$(28) \ y = \frac{4}{3}\pi r^3$$

$$y = \frac{dy}{dx} = \frac{d}{dr} \left(\frac{4}{3}\pi r^3 \right) \quad \text{aplicamos (3)}$$

$$y' = \frac{4}{3} \pi \frac{d}{dr} (r^3) \quad \text{aplicamos (5)}$$

$$y' = \frac{4}{3} \pi (3r^2)$$

$$y' = 4\pi r^2$$

$$(29) y = \frac{1}{\sqrt{x}}$$

aplicamos el convenio

$$y = \frac{1}{x^{1/2}}$$

aplicamos (II)

$$y' = x^{-1/2}$$

$$y' = \frac{dy}{dx} = \frac{d(x^{-1/2})}{dx}$$

aplicamos (5)

$$y' = -\frac{1}{2} x^{-3/2}$$

aplicamos (II)

$$y' = -\frac{1}{2x^{3/2}} = -\frac{1}{2xx^{1/2}}$$

$$y' = -\frac{1}{2x\sqrt{x}}$$

$$(30) y = \frac{1}{\sqrt[3]{x}}$$

aplicamos el convenio

$$y = \frac{1}{x^{1/3}}$$

aplicamos (II)

$$y' = x^{-1/3}$$

$$y' = \frac{dy}{dx} = \frac{d(x^{-1/3})}{dx}$$

aplicamos (5)

$$y' = -\frac{1}{3} x^{-4/3}$$

aplicamos (II)

$$y' = -\frac{1}{3x^{4/3}}$$

$$(31) y = \frac{1}{\sqrt[n]{x}}$$

aplicamos el convenio

$$y = \frac{1}{x^{1/n}}$$

aplicamos (II)

$$y' = x^{-1/n}$$

$$y' = \frac{dy}{dx} = \frac{d(x^{-1/n})}{dx}$$

aplicamos (5)

$$y' = -\frac{1}{n} x^{\left(\frac{1+n}{n}\right)}$$

aplicamos (II)

$$y' = -\frac{1}{nx^{\left(\frac{1+n}{n}\right)}}$$

$$(32) \quad y = -\frac{2}{x} - \frac{3}{x^2} \quad \text{aplicamos (II)}$$

$$y = -2x^{-1} - 3x^{-2}$$

$$y' = \frac{dy}{dx} = \frac{d}{dx}(-2x^{-1} - 3x^{-2}) \quad \text{aplicamos (4) y (3)}$$

$$y' = -2 \frac{d}{dx}(x^{-1}) - 3 \frac{d}{dx}(x^{-2}) \quad \text{aplicamos (5)}$$

$$y' = -2(-x^{-2}) - 3(-2x^{-3}) \quad \text{aplicamos (II)}$$

$$y' = \frac{2}{x^2} + \frac{6}{x^3}$$

$$(33) \quad y = -\frac{6}{x^{1/3}} - \frac{4}{x^{3/4}} \quad \text{aplicamos (II)}$$

$$y = 6x^{-1/3} - 4x^{-3/4}$$

$$y' = \frac{dy}{dx} = \frac{d}{dx}(6x^{-1/3} - 4x^{-3/4}) \quad \text{aplicamos (3)}$$

$$y' = 6 \frac{d}{dx}(x^{-1/3}) - 4 \frac{d}{dx}(x^{-3/4}) \quad \text{aplicamos (5)}$$

$$y' = 6\left(-\frac{1}{3}x^{-4/3}\right) - 4\left(-\frac{3}{4}x^{-7/4}\right) \quad \text{aplicamos (II)}$$

$$y' = -\frac{2}{x^{4/3}} + \frac{3}{x^{7/4}}$$

$$(34) \quad y = -\frac{ax^2+bx+c}{x} \quad \text{dividimos.}$$

$$y = ax + b + \frac{c}{x} \quad \text{aplicamos (II)}$$

$$y = ax + b + cx^{-1}$$

$$y' = \frac{dy}{dx} = \frac{d}{dx}(ax + b + cx^{-1}) \quad \text{aplicamos (3) y (4)}$$

$$y' = a \frac{d(x)}{dx} + b \frac{d(1)}{dx} + c \frac{d(x^{-1})}{dx} \quad \text{aplicamos (2), (1) y (5)}$$

$$y' = a(1) + 0 - cx^{-2} \quad \text{aplicamos (II)}$$

$$y' = a - \frac{c}{x^2}$$

$$(35) \ y = -\frac{a+bx+cx^2}{\sqrt{x}} \quad \text{aplicamos el convenio.}$$

$$y = \frac{a+bx+cx^2}{x^{1/2}} \quad \text{aplicamos (II)}$$

$$y = (a + bx + cx^2)x^{-1/2} \quad \text{multiplicamos.}$$

$$y = ax^{-1/2} + bx^{1/2} + cx^{3/2}$$

$$y' = \frac{dy}{dx} = \frac{d}{dx}(ax^{-1/2} + bx^{1/2} + cx^{3/2}) \quad \text{aplicamos (4) y (3)}$$

$$y' = a \frac{d(x^{-1/2})}{dx} + b \frac{d(x^{1/2})}{dx} + c \frac{d(x^{3/2})}{dx} \quad \text{aplicamos (5)}$$

$$y' = a\left(-\frac{1}{2}x^{-3/2}\right) + b\left(\frac{1}{2}x^{-1/2}\right) + c\left(\frac{3}{2}x^{1/2}\right) \quad \text{aplicamos (II)}$$

$$y' = \frac{a}{2x^{3/2}} + \frac{b}{2x^{1/2}} + \frac{3}{2}cx^{1/2}$$

$$(36) \ y = -\frac{x^3+3x+6}{3} \quad \text{Dividimos.}$$

$$y = \frac{x^3}{3} - x + 2$$

$$y' = \frac{dy}{dx} = \frac{d}{dx}\left(\frac{x^3}{3} - x + 2\right) \quad \text{aplicamos (4) y (3).}$$

$$y' = \frac{1}{3} \frac{d(x^3)}{dx} - \frac{d(x)}{dx} + \frac{d(2)}{dx} \quad \text{aplicamos (5), (2) y (1)}$$

$$y' = \frac{1}{3}(3x^2) - 1 + 0$$

$$y' = x^2 - 1$$

$$(37) \ y = \sqrt{3}(x^3 - x^2) \quad \text{Multiplicamos.}$$

$$y = \sqrt{3}x^3 - \sqrt{3}x^2$$

$$y' = \frac{dy}{dx} = \frac{d}{dx}(\sqrt{3}x^3 - \sqrt{3}x^2) \quad \text{aplicamos (4) y (3).}$$

$$y' = \sqrt{3} \frac{d(x^3)}{dx} - \sqrt{3} \frac{d(x^2)}{dx} \quad \text{aplicamos (5)}$$

$$y' = \sqrt{3}(3x^2) - \sqrt{3}(2x)$$

$$y' = \sqrt{3}(3x^2 - 2x)$$

$$(38) y = (x^2 + 1)^2$$

Efectuamos el producto.

$$y = x^4 + 2x^2 + 1$$

$$y' = \frac{dy}{dx} = \frac{d}{dx}(x^4 + 2x^2 + 1) \quad \text{aplicamos (4) y (3).}$$

$$y' = \frac{d(x^4)}{dx} + 2 \frac{d(x^2)}{dx} + \frac{d(1)}{dx} \quad \text{aplicamos (5) y (1)}$$

$$y' = 4x^3 + 2(2x) + 0$$

$$y' = 2x(2x^2 + 2)$$

$$(39) y = (x + 1)^3$$

Efectuamos el producto.

$$y = x^3 + 3x^2 + 3x + 1$$

$$y' = \frac{d}{dx}(x^3 + 3x^2 + 3x + 1) \quad \text{aplicamos (4) y (3).}$$

$$y' = \frac{d(x^3)}{dx} + 3 \frac{d(x^2)}{dx} + 3 \frac{d(x)}{dx} + \frac{d(1)}{dx} \quad \text{aplicamos (5), (2) y (1)}$$

$$y' = 3x^2 + 3(2x) + 3(1) + 0$$

$$y' = 3x^2 + 6x + 3$$

$$(40) y = (3x^2)^5$$

$$y' = \frac{dy}{dx} = \frac{d(3x^2)^5}{dx} \quad \text{aplicamos (6)}$$

$$y' = 5(3x^2)^4 \frac{d(3x^2)}{dx} \quad \text{aplicamos (3).}$$

$$y' = 5(3x^2)^4 3 \frac{d(x^2)}{dx} \quad \text{aplicamos (5)}$$

$$y' = 15(3x^2)^4(2x)$$

$$y' = 30x (3x^2)^4$$

$$(41) y = (ax)^4$$

$$y' = \frac{dy}{dx} = \frac{d(ax)^4}{dx} \quad \text{aplicamos (6)}$$

$$y' = 4(ax)^3 \frac{d(ax)}{dx} \quad \text{aplicamos (3).}$$

$$y' = 4(ax)^3 a \frac{d(x)}{dx} \quad \text{aplicamos (2)}$$

$$y' = 4a(ax)^3$$

$$(42) \ y = a(bx^3)^{5/4}$$

$$y' = \frac{dy}{dx} = \frac{d[a(bx^3)^{5/4}]}{dx} \quad \text{aplicamos (3)}$$

$$y' = a \frac{d(bx^3)^{5/4}}{dx} \quad \text{aplicamos (6).}$$

$$y' = a \left[\frac{5}{4} (bx^3)^{1/4} \frac{d(bx^3)}{dx} \right] \quad \text{aplicamos (3) y (5)}$$

$$y' = \frac{5}{4} ab(bx^3)^{1/4} (3x^2)$$

$$y' = \frac{15}{4} abx^2(bx^3)^{1/4}$$

$$(43) \ y = \sqrt{ax} \quad \text{aplicamos el convenio.}$$

$$y = (ax)^{1/2}$$

$$y' = \frac{dy}{dx} = \frac{d(ax)^{1/2}}{dx} \quad \text{aplicamos (6).}$$

$$y' = \frac{1}{2} (ax)^{-1/2} \frac{d(ax)}{dx} \quad \text{aplicamos (3)}$$

$$y' = \frac{1}{2} (ax)^{-1/2} a \frac{d(x)}{dx} \quad \text{aplicamos (2)}$$

$$y' = \frac{a}{2} (ax)^{-1/2} (1) \quad \text{aplicamos (II)}$$

$$y' = \frac{a}{2(ax)^{1/2}} \quad \text{aplicamos el convenio.}$$

$$y' = \frac{a}{2\sqrt{ax}}$$

$$(44) \ y = \frac{1}{\sqrt{bx}} \quad \text{aplicamos el convenio.}$$

$$y = \frac{1}{bx^{1/2}} \quad \text{aplicamos (II)}$$

$$y = (bx)^{-1/2}$$

$$y' = \frac{dy}{dx} = \frac{d(bx)^{-1/2}}{dx} \quad \text{aplicamos (6)}$$

$$y' = \frac{1}{2} (bx)^{-3/2} \frac{d(bx)}{dx} \quad \text{aplicamos (3) y (2)}$$

$$y' = \frac{b}{2} (bx)^{-3/2} (1) \quad \text{aplicamos (II)}$$

$$y' = \frac{b}{2(bx)^{3/2}}$$

$$y' = \frac{\cancel{b}}{2(\cancel{bx})(bx)^{1/2}} \quad \text{aplicamos el convenio.}$$

$$y' = \frac{1}{2x\sqrt{bx}}$$

$$(45) \ y = \sqrt[3]{5x^3} \quad \text{aplicamos el convenio.}$$

$$y = (5x^3)^{1/3}$$

$$y' = \frac{dy}{dx} = \frac{d(5x^3)^{1/3}}{dx} \quad \text{aplicamos (6).}$$

$$y' = \frac{1}{3} (5x^3)^{-2/3} \frac{d(5x^3)}{dx} \quad \text{aplicamos (3) y (5)}$$

$$y' = \frac{1}{3} (5x^3)^{-2/3} (15x^2) \quad \text{aplicamos (II)}$$

$$y' = \frac{5x^2}{(5x^3)^{2/3}}$$

$$(46) \ y = (x^2 + 1)^5$$

$$y' = \frac{dy}{dx} = \frac{d(x^2+1)^5}{dx} \quad \text{aplicamos (6)}$$

$$y' = 5(x^2 + 1)^4 \frac{d(x^2+1)}{dx} \quad \text{aplicamos (5) y (1).}$$

$$y' = 5(x^2 + 1)^4 (2x + 0)$$

$$y' = 10x(x^2 + 1)^4$$

$$(47) \ y = (x^3 + x + 1)^3$$

$$y' = \frac{dy}{dx} = \frac{d(x^3 + x + 1)^3}{dx} \quad \text{aplicamos (6)}$$

$$y' = 3(x^3 + x + 1)^2 \frac{d(x^3 + x + 1)}{dx} \quad \text{aplicamos (5), (2) y (1).}$$

$$y' = 3(x^3 + x + 1)^2 (3x^2 + 1 + 0)$$

$$y' = 3(3x^2 + 1)(x^3 + x + 1)$$

$$(48) \ y = \frac{1}{(x^2 + 8)^3} \quad \text{aplicamos (II)}$$

$$y = (x^2 + 8)^{-3}$$

$$y' = \frac{dy}{dx} = \frac{d(x^2 + 8)^{-3}}{dx} \quad \text{aplicamos (6).}$$

$$y' = -3(x^2 + 8)^{-4} \frac{d(x^2 + 8)}{dx} \quad \text{aplicamos (5) y (1)}$$

$$y' = -3(x^2 + 8)^{-4} (2x + 0) \quad \text{aplicamos (II)}$$

$$y' = \frac{-6x}{(x^2 + 8)^4}$$

$$(49) \ y = \sqrt{x^2 + 2} \quad \text{aplicamos el convenio.}$$

$$y = (x^2 + 2)^{1/2}$$

$$y' = \frac{dy}{dx} = \frac{d(x^2 + 2)^{1/2}}{dx} \quad \text{aplicamos (6).}$$

$$y' = \frac{1}{2}(x^2 + 2)^{-1/2} \frac{d(x^2 + 2)}{dx} \quad \text{aplicamos (5) y (1)}$$

$$y' = \frac{1}{2}(x^2 + 2)^{-1/2} (2x + 0) \quad \text{aplicamos (II)}$$

$$y' = \frac{x}{(x^2 + 2)^{1/2}} \quad \text{aplicamos el convenio.}$$

$$y' = \frac{x}{\sqrt{x^2 + 2}}$$

$$(50) \ y = \sqrt[3]{x^3 + x + 16} \quad \text{aplicamos el convenio.}$$

$$y = (x^3 + x + 16)^{1/3}$$

$$y' = \frac{dy}{dx} = \frac{d(x^3 + x + 16)^{1/3}}{dx} \quad \text{aplicamos (6).}$$

$$y' = \frac{1}{3}(x^3 + x + 16)^{-2/3} \frac{d(x^3 + x + 16)}{dx} \quad \text{aplicamos (5), (2) y (1)}$$

$$y' = \frac{1}{3}(x^3 + x + 16)^{-2/3} (3x^2 + 1 + 0) \quad \text{aplicamos (II)}$$

$$y' = \frac{1}{3(x^3 + x + 16)^{2/3}}$$

$$(51) \ y = \frac{1}{\sqrt{b^2 - x^2}} \quad \text{aplicamos el convenio.}$$

$$y = \frac{1}{(b^2 - x^2)^{1/2}} \quad \text{aplicamos (II)}$$

$$y = (b^2 - x^2)^{-1/2}$$

$$y' = \frac{dy}{dx} = \frac{d(b^2 - x^2)^{-1/2}}{dx} \quad \text{aplicamos (6)}$$

$$y' = -\frac{1}{2}(b^2 - x^2)^{-3/2} \frac{d(b^2 - x^2)}{dx} \quad \text{aplicamos (1) y (5)}$$

$$y' = -\frac{1}{2}(b^2 - x^2)^{-3/2}(0 - 2x) \quad \text{aplicamos (II)}$$

$$y' = \frac{x}{(b^2 - x^2)^{3/2}}$$

$$(52) \ y = \left(1 - \frac{2}{x^2}\right)^3 \quad \text{aplicamos (II).}$$

$$y = (1 - 2x^{-2})^3$$

$$y' = \frac{dy}{dx} = \frac{d(1 - 2x^{-2})^3}{dx} \quad \text{aplicamos (6)}$$

$$y' = 3(1 - 2x^{-2})^2 \frac{d(1 - 2x^{-2})}{dx} \quad \text{aplicamos (1), (3) y (5)}$$

$$y' = 3(1 - 2x^{-2})^2 (0 + 4x^{-3})$$

$$y' = 12x^{-3}(1 - 2x^{-2})^2 \quad \text{aplicamos (II)}$$

$$y' = \frac{12}{x^3} \left(1 - \frac{2}{x^2}\right)^2$$

$$(53) \ y = \left(1 - \frac{b}{x^3}\right)^4 \quad \text{aplicamos (II).}$$

$$y = (a + bx^{-3})^4$$

$$y' = \frac{dy}{dx} = \frac{d(a+bx^{-3})^4}{dx} \quad \text{aplicamos (6)}$$

$$y' = 4(a - bx^{-3})^3 \frac{d(a+bx^{-3})}{dx} \quad \text{aplicamos (1), (3) y (5)}$$

$$y' = 4(a - bx^{-3})^3 (0 - 3bx^{-4})$$

$$y' = -12x^{-4}b(a + bx^{-3})^3 \quad \text{aplicamos (II)}$$

$$y' = -\frac{12b}{x^4} \left(a + \frac{b}{x^3}\right)^3$$

$$(54) \ y = 5\sqrt{5x+7} \quad \text{aplicamos el convenio.}$$

$$y = 5(5x+7)^{1/2}$$

$$y' = \frac{dy}{dx} = \frac{d[5(5x+7)^{1/2}]}{dx} \quad \text{aplicamos (3)}$$

$$y' = 5 \frac{d(5x+7)^{1/2}}{dx} \quad \text{aplicamos (6)}$$

$$y' = 5 \left[\frac{1}{2} (5x+7)^{-1/2} \right] \frac{d(5x+7)}{dx} \quad \text{aplicamos (3), (2) y (1)}$$

$$y' = 5 \left[\frac{1}{2} (5x+7)^{-1/2} \right] (5) \quad \text{aplicamos (II)}$$

$$y' = \frac{25}{2(5x+7)^{1/2}}$$

$$(55) \ y = \frac{a}{b} \sqrt{cx} \quad \text{aplicamos el convenio.}$$

$$y = \frac{a}{b} (cx)^{1/2}$$

$$y' = \frac{dy}{dx} = \frac{d\left[\frac{a}{b}(cx)^{1/2}\right]}{dx} \quad \text{aplicamos (3)}$$

$$y' = \frac{a}{b} \frac{d(cx)^{1/2}}{dx} \quad \text{aplicamos (6)}$$

$$y' = \frac{a}{b} \left[\frac{1}{2} (cx)^{-1/2} \frac{d(cx)}{dx} \right] \quad \text{aplicamos (3) y (1)}$$

$$y' = \frac{a}{b} \left[\frac{1}{2} (cx)^{-1/2} (c) \right]$$

$$y' = \frac{ac(cx)^{-1/2}}{2b} \quad \text{aplicamos (II)}$$

$$y' = \frac{ac}{2b(cx)^{1/2}} \quad \text{aplicamos el convenio.}$$

$$y' = \frac{ac}{2b\sqrt{cx}}$$

$$(56) \ y = a^b (x+1)^5$$

$$y' = \frac{dy}{dx} = \frac{d[a^b(x+1)^5]}{dx} \quad \text{aplicamos (3)}$$

$$y' = a^b \frac{d(x+1)^5}{dx} \quad \text{aplicamos (6)}$$

$$y' = a^b \left[5(x+1)^4 \frac{d(x+1)}{dx} \right] \quad \text{aplicamos (2) y (1)}$$

$$y' = a^b [5(x+1)^4 (1)]$$

$$y' = 5a^b (x+1)^4$$

$$(57) \ y = \frac{(x+3)^3}{8}$$

$$y' = \frac{dy}{dx} = \frac{d}{dx} \left[\frac{(x+3)^3}{8} \right] \quad \text{aplicamos (3)}$$

$$y' = \frac{1}{8} \frac{d(x+3)^3}{dx} \quad \text{aplicamos (6)}$$

$$y' = \frac{1}{8} \left[3(x+3)^2 \frac{d(x+3)}{dx} \right] \quad \text{aplicamos (2) y (1)}$$

$$y' = \frac{1}{8} [3(x+3)^2 (1)]$$

$$y' = \frac{3(x+3)^2}{8}$$

$$(58) \ y = x(5x)^4$$

$$y' = \frac{dy}{dx} = \frac{d}{dx} [x(5x)^4] \quad \text{aplicamos (7)}$$

$$y' = x \frac{d(5x)^4}{dx} + (5x)^4 \frac{d(x)}{dx} \quad \text{aplicamos (6) y (2)}$$

$$y' = \frac{1}{8} \left[3(x+3)^2 \frac{d(x+3)}{dx} \right] \quad \text{aplicamos (2) y (1)}$$

$$y' = x \left[4(5x)^3 \frac{d(5x)}{dx} \right] + (5x)^4 (1)$$

$$y' = 20x(5x)^3 + (5x)^4$$

$$(59) \ y = x\sqrt{ax} \quad \text{aplicamos el convenio.}$$

$$y' = x(ax)^{1/2} \quad \text{aplicamos (7)}$$

$$y' = x \frac{d(ax)^{1/2}}{dx} + (ax)^{1/2} \frac{d(x)}{dx}$$

$$y' = x \left[\frac{1}{2} (ax)^{1/2} (a) \right] + (ax)^{1/2}$$

$$y' = \frac{ax}{2(ax)^{1/2}} + (ax)^{1/2} \quad \text{aplicamos el convenio.}$$

$$y' = \frac{ax}{2\sqrt{ax}} + \sqrt{ax}$$

$$(60) \ y = x^2(x+1)^6 \quad \text{aplicamos (7)}$$

$$y' = x^2 \frac{d(x+1)^6}{dx} + (x+1)^6 \frac{d(x^2)}{dx} \quad \text{aplicamos (6) y (5)}$$

$$y' = x^2[6(x+1)^5(1)] + (x+1)^6(2x)$$

$$y' = 6x^2(x+1)^5 + 2x(x+1)^6$$

$$(61) \ y = x\sqrt{a+bx} \quad \text{aplicamos el convenio.}$$

$$y' = x(a+bx)^{1/2} \quad \text{aplicamos (7)}$$

$$y' = x \frac{d(a+bx)^{1/2}}{dx} + (a+bx)^{1/2} \frac{d(x)}{dx} \quad \text{aplicamos (6) y (2)}$$

$$y' = x \left[\frac{1}{2}(a+bx)^{-1/2}(b) \right] + (a+bx)^{1/2}(1)$$

$$y' = \frac{bx}{2(a+bx)^{1/2}} + (a+bx)^{1/2}$$

$$y' = \frac{bx}{2\sqrt{a+bx}} + \sqrt{a+bx} \quad \frac{bx+2(\sqrt{a+bx})^2}{2\sqrt{a+bx}}$$

$$y' = \frac{bx+2(a+bx)}{2\sqrt{a+bx}}$$

$$y' = \frac{bx+2a+2bx}{2\sqrt{a+bx}}$$

$$y' = \frac{2a+3bx}{2\sqrt{a+bx}}$$

$$(62) \ y = (x+a)(x-b) \quad \text{aplicamos (7)}$$

$$y' = (x+a) \frac{d(x-b)}{dx} + (x-b) \frac{d(x+a)}{dx}$$

$$y' = (x+a)(1) + (x-b)(1)$$

$$y' = x+a+x-b$$

$$y' = 2x+a-b$$

$$(63) \ y = (x^3+a)(x^3-a) \quad \text{aplicamos (7)}$$

$$y' = (x^3+a) \frac{d(x^3-a)}{dx} + (x^3-a) \frac{d(x^3+a)}{dx} \quad \text{aplicamos (5) y (1)}$$

$$y' = (x^3+a)(3x^2) + (x^3-a)(3x^2)$$

$$y' = 3x^2(x^3+a) + 3x^2(x^3-a)$$

$$(64) \ y = \sqrt{x}(2x - 1) \quad \text{aplicamos el convenio.}$$

$$y' = x^{1/2} (2x - 1) \quad \text{aplicamos (7)}$$

$$y' = x^{1/2} \frac{d(2x+1)}{dx} + (2x + 1) \frac{d(x^{1/2})}{dx}$$

$$y' = x^{1/2}(2) + (2x + 1) \left(\frac{1}{2}x^{-1/2}\right)$$

$$y' = 2x^{1/2} + \frac{2x-1}{2x^{1/2}} \quad \text{sumamos}$$

$$y' = \frac{4x+2x-1}{2x^{1/2}} \quad \text{simplificamos y aplicamos el convenio.}$$

$$y' = \frac{6x-1}{2\sqrt{x}}$$

$$(65) \ y = \frac{2x^4}{a^2-x^2} \quad \text{aplicamos (8)}$$

$$u = 2x^4 \quad v = a^2 - x^2$$

$$\frac{du}{dx} = 8x^3 \quad \frac{dv}{dx} = -2x$$

$$y' = \frac{(a^2-x^2)(8x^3)-2x^4(-2x)}{(a^2-x^2)^2}$$

$$y' = \frac{8a^2x^3-8x^5+4x^5}{(a^2-x^2)^2}$$

$$y' = \frac{4x^3(2a^2-x^2)}{(a^2-x^2)^2}$$

$$(66) \ y = \frac{b-x}{b+x} \quad \text{aplicamos (8)}$$

$$u = b - x \quad v = b + x$$

$$\frac{du}{dx} = -1 \quad \frac{dv}{dx} = 1$$

$$y' = \frac{(b+x)(-1) - (b-x)(1)}{(b+x)^2}$$

$$y' = \frac{-b-x-b+x}{(b+x)^2}$$

$$y' = \frac{2b}{(b+x)^2}$$

$$(67) \ y = \frac{x^3}{1+x^2} \quad \text{aplicamos (8)}$$

$$u = x^3 \quad v = 1 + x^2$$

$$\frac{du}{dx} = 3x^2 \quad \frac{dv}{dx} = 2x$$

$$y' = \frac{(1+x^2)(3x^2) - x^3(2x)}{(1+x^2)^2}$$

$$y' = \frac{3x^2+3x^4-2x^4}{(1+x^2)^2} \quad \frac{x^4+3x^2}{(1+x^2)^2}$$

$$y' = \frac{x^2(x^2+3)}{(1+x^2)^2}$$

$$(68) \ y = \frac{x^2+2}{3-x^2} \quad \text{aplicamos (8)}$$

$$u = x^2 + 2 \quad v = 3 - x^2$$

$$\frac{du}{dx} = 2x \quad \frac{dv}{dx} = -2x$$

$$y' = \frac{(3-x^2)(2x) - (x^2+2)(-2x)}{(3-x^2)^2}$$

$$y' = \frac{6x-2x^3+2x^3+4x}{(3-x^2)^2} \quad \text{simplificamos}$$

$$y' = \frac{10x}{(3-x^2)^2}$$

$$(69) \quad y = \sqrt{\frac{1+x}{1-x}} \quad \text{aplicamos el convenio.}$$

$$y = \frac{(1+x)^{1/2}}{(1-x)^{1/2}} \quad \text{aplicamos (8)}$$

$$u = (1+x)^{1/2} \quad v = (1-x)^{1/2}$$

$$\frac{du}{dx} = \frac{1}{2(1+x)^{1/2}} \quad \frac{dv}{dx} = \frac{1}{2(1-x)^{1/2}}$$

$$y' = \frac{\frac{(1-x)^{1/2}}{2(1+x)^{1/2}} + \frac{(1+x)^{1/2}}{2(1-x)^{1/2}}}{1-x} \quad \text{sumamos}$$

$$y' = \frac{\frac{1-x+1+x}{2(1+x)^{1/2}2(1-x)^{1/2}}}{1-x}$$

$$y' = \frac{1}{(1+x)^{1/2}(1-x)^{1/2}(1-x)}$$

$$y' = \frac{1}{(1-x)(1-x^2)^{1/2}} \quad \text{aplicamos el convenio.}$$

$$y' = \frac{1}{(1-x)\sqrt{1-x^2}}$$

$$(9) \quad \frac{d(\ln v)}{dx} = \frac{1}{v} \frac{dv}{dx}$$

$$(10) \quad \frac{d(a^v)}{dx} = a^v \ln a \frac{dv}{dx}$$

$$(11) \quad \frac{d(e^v)}{dx} = e^v \frac{dv}{dx}$$

$$(70) \ y = \ln x \quad \text{aplicamos (9)}$$

$$y' = \frac{1}{x} \frac{dx}{dx} \quad \text{aplicamos (2)}$$

$$y' = \frac{1}{x}$$

$$(71) \ y = \ln x^2 \quad \text{aplicamos (9)}$$

$$y' = \frac{1}{x^2} \frac{d(x^2)}{dx} \quad \text{aplicamos (5)}$$

$$y' = \frac{1}{x^2} (2x)$$

$$y' = \frac{2}{x}$$

$$(72) \ y = \ln x^n \quad \text{aplicamos (9)}$$

$$y' = \frac{1}{x^n} \frac{d(x^n)}{dx} \quad \text{aplicamos (5)}$$

$$y' = \frac{1}{x^n} (nx^{n-1}) \quad \text{aplicamos (I)}$$

$$y' = \frac{nx^n x^{-1}}{x^n} \quad \text{simplificamos}$$

$$y' = nx^{-1} \quad \text{aplicamos (II)}$$

$$y' = \frac{n}{x}$$

$$(73) \ y = \ln(ax + b) \quad \text{aplicamos (9)}$$

$$y' = \frac{1}{ax+b} \frac{d(ax+b)}{dx}$$

$$y' = \frac{1}{ax+b} (a)$$

$$y' = \frac{a}{ax+b}$$

$$(74) \ y = \ln(ax + b)^2 \quad \text{aplicamos (9)}$$

$$y' = \frac{1}{(ax+b)^2} \frac{d(ax+b)^2}{dx} \quad \text{aplicamos (6)}$$

$$y' = \frac{1}{(ax+b)^2} 2(ax + b)(a) \quad \text{simplificamos.}$$

$$y' = \frac{2a}{ax+b}$$

$$(75) \ y = \ln^5 x$$

$$y' = (\ln x)^5 \quad \text{aplicamos (6)}$$

$$y' = 5(\ln x)^4 \frac{d(\ln x)}{dx} \quad \text{aplicamos (9)}$$

$$y' = 5(\ln x)^4 \left(\frac{1}{x}\right)$$

$$y' = \frac{5(\ln x)^4}{x}$$

$$(76) \ y = \ln \frac{1+x^2}{1-x^2} \quad \text{aplicamos (9)}$$

$$y' = \frac{1}{\frac{1+x^2}{1-x^2}} \frac{d\left(\frac{1+x^2}{1-x^2}\right)}{dx} \quad \text{aplicamos (8)}$$

$$u = 1 + x^2 \quad v = 1 - x^2$$

$$\frac{du}{dx} = 2x \quad \frac{dv}{dx} = -2x$$

$$y' = \frac{1-x^2}{1+x^2} \frac{(1-x^2)(2x) - (1+x^2)(-2x)}{(1-x^2)^2}$$

$$y' = \frac{1-x^2}{1+x^2} \frac{2x-2x^3+2x+2x^3}{(1-x^2)^2} \quad \text{simplificamos}$$

$$y' = \frac{4x}{(1+x^2)^2 (1-x^2)^2}$$

$$y' = \frac{4x}{1-x^4}$$

$$(77) \ y = x \cdot \ln x \quad \text{aplicamos (7)}$$

$$y' = x \frac{d(\ln x)}{dx} + \ln x \frac{dx}{dx} \quad \text{aplicamos (9) y (2)}$$

$$y' = x \left(\frac{1}{x}\right) + \ln x (1)$$

$$y' = 1 + \ln x$$

$$(78) \ y = \ln(\ln x) \quad \text{aplicamos (9)}$$

$$y' = \frac{1}{\ln x} \frac{d(\ln x)}{dx} \quad \text{aplicamos (9)}$$

$$y' = \frac{1}{\ln x} \cdot \frac{1}{x}$$

$$y' = \frac{1}{x \ln x}$$

$$(79) \ y = \ln(x^3 + 4)(x^2 + 7) \quad \text{aplicamos (VI)}$$

$$y' = \ln(x^3 + 4) + \ln(x^2 + 7) \quad \text{aplicamos (9)}$$

$$y' = \frac{1}{x^3+4} \frac{d}{dx} (x^3 + 4) + \frac{1}{x^2+7} \frac{d}{dx} (x^2 + 7) \quad \text{aplicamos (5) y (1)}$$

$$y' = \frac{3x^2}{x^3+4} + \frac{2x}{x^2+7}$$

$$(80) \ y = \ln \frac{x^4}{x^3+3} \quad \text{aplicamos (VII)}$$

$$y' = \ln x^4 + \ln(x^3 + 3) \quad \text{aplicamos (9)}$$

$$y' = \frac{1}{x^4} \frac{d}{dx} (x^4) - \frac{1}{x^3+3} \frac{d}{dx} (x^3 + 3) \quad \text{aplicamos (5) y (1)}$$

$$y' = \frac{4x^3}{x^4} - \frac{3x^2}{x^3+3} \quad \text{simplificamos}$$

$$y' = \frac{4}{x} - \frac{3x^2}{x^3+3}$$

$$(81) \ y = a^x \quad \text{aplicamos (10)}$$

$$y' = a^x \ln a \frac{dx}{dx} \quad \text{aplicamos (2)}$$

$$y' = a^x \ln a$$

$$(82) \ y = a^{x^2} \quad \text{aplicamos (10)}$$

$$y' = a^{x^2} \ln a \frac{d}{dx} (x^2) \quad \text{aplicamos (5)}$$

$$y' = a^{x^2} \ln a (2x) \quad \text{ordenamos}$$

$$y' = 2x \cdot a^{x^2} \ln a$$

$$(83) y = a^{x^n} \quad \text{aplicamos (10)}$$

$$y' = a^{x^n} \ln a \frac{d}{dx}(x^n) \quad \text{aplicamos (5)}$$

$$y' = a^{x^n} \ln a (nx^{n-1}) \quad \text{ordenamos}$$

$$y' = nx^{n-1} a^{x^n} \ln a$$

$$(84) y = a^{\sqrt{x}} \quad \text{aplicamos el convenio.}$$

$$y' = a^{x^{1/2}} \quad \text{aplicamos (10)}$$

$$y' = a^{x^{1/2}} \ln a \frac{d}{dx}(x^{1/2}) \quad \text{aplicamos (5)}$$

$$y' = a^{x^{1/2}} \ln a \left(\frac{1}{2} x^{-1/2}\right) \quad \text{aplicamos (II)}$$

$$y' = \frac{a^{x^{1/2}} \ln a}{2x^{1/2}} \quad \text{aplicamos el convenio.}$$

$$y' = \frac{a^{\sqrt{x}} \ln a}{2\sqrt{x}}$$

$$(85) y = x^2 8^x \quad \text{aplicamos (6)}$$

$$y' = x^2 \frac{d}{dx}(8^x) + 8^x \frac{d}{dx}(x^2) \quad \text{aplicamos (10) y (5)}$$

$$y' = x^2 8^x \ln 8 + 8^x (2x)$$

$$y' = x^2 8^x \ln 8 + 2x 8^x$$

$$y' = x 8^x (x \ln 8 + 2)$$

$$(86) y = c^{a^2 - x^2} \quad \text{aplicamos (10)}$$

$$y' = c^{a^2 - x^2} \ln c \frac{d}{dx}(a^2 - x^2) \quad \text{aplicamos (1) y (5)}$$

$$y' = 2x c^{a^2 - x^2} \ln c$$

$$(87) y = a^{\ln x} \quad \text{aplicamos (10)}$$

$$y' = a^{\ln x} \ln a \frac{d}{dx}(\ln x) \quad \text{aplicamos (9)}$$

$$y' = \frac{a^{\ln x} \ln a}{x}$$

$$(88) \ y = e^x \quad \text{aplicamos (11)}$$

$$y' = e^x \frac{dx}{dx} \quad \text{aplicamos (2)}$$

$$y' = e^x$$

$$(89) \ y = e^{x^2} \quad \text{aplicamos (11)}$$

$$y' = e^{x^2} \frac{d}{dx}(x^2) \quad \text{aplicamos (5)}$$

$$y' = 2xe^{x^2}$$

$$(90) \ y = e^{x^n} \quad \text{aplicamos (11)}$$

$$y' = e^{x^n} \frac{d}{dx}(x^n) \quad \text{aplicamos (5)}$$

$$y' = n^{n-1}e^{x^n}$$

$$(91) \ y = e^{ax} \quad \text{aplicamos (11)}$$

$$y' = e^{ax} \frac{d}{dx}(ax)$$

$$y' = e^{ax}(a)$$

$$y' = ae^{ax}$$

$$(92) \ y = e^{4x+6} \quad \text{aplicamos (11)}$$

$$y' = e^{4x+6} \frac{d}{dx}(4x+6)$$

$$y' = e^{4x+6}(4)$$

$$y' = 4e^{4x+6}$$

$$(93) \ y = e^{(x^2+1)^3} \quad \text{aplicamos (11)}$$

$$y' = e^{(x^2+1)^3} \frac{d}{dx}(x^2+1)^3 \quad \text{aplicamos (6)}$$

$$y' = e^{(x^2+1)^3} 3(x^2+1)^2(2x)$$

$$y' = 6x(x^2+1)^2 e^{(x^2+1)^3}$$

$$(94) \ y = \frac{1}{e^x} \quad \text{aplicamos (II)}$$

$$y' = e^{-x} \quad \text{aplicamos (11)}$$

$$y' = e^{-x} \frac{d}{dx}(-x) \quad \text{aplicamos (2)}$$

$$y' = e^{-x}(-1) \quad \text{aplicamos (II)}$$

$$y' = -\frac{1}{e^x}$$

$$(95) \ y = e^{\sqrt{x}} \quad \text{aplicamos el convenio.}$$

$$y' = e^{x^{1/2}} \quad \text{aplicamos (11)}$$

$$y' = e^{x^{1/2}} \frac{d}{dx}(x^{1/2}) \quad \text{aplicamos (5)}$$

$$y' = e^{x^{1/2}} \left(\frac{1}{2} x^{-1/2} \right) \quad \text{aplicamos (II)}$$

$$y' = \frac{e^{x^{1/2}}}{2x^{1/2}} \quad \text{aplicamos el convenio.}$$

$$y' = \frac{e^{\sqrt{x}}}{2\sqrt{x}}$$

$$(96) \ y = xe^x \quad \text{aplicamos (7)}$$

$$y' = x \frac{d}{dx}(e^x) + e^x \frac{d}{dx}(x) \quad \text{aplicamos (11) y (2)}$$

$$y' = xe^x + e^x(1) \quad \text{factorizamos } e^x$$

$$y' = e^x(x+1)$$

$$(97) \ y = \ln(x^2 e^x) \quad \text{aplicamos (9)}$$

$$y' = \frac{1}{x^2 e^x} \frac{d}{dx}(x^2 e^x) \quad \text{aplicamos (7)}$$

$$y' = \frac{1}{x^2 e^x} \left[x^2 \frac{d}{dx}(e^x) + e^x \frac{d}{dx}(x^2) \right] \quad \text{aplicamos (11) y (5)}$$

$$y' = \frac{1}{x^2 e^x} (x^2 e^x + 2xe^x)$$

$$y' = \frac{x^2 e^x}{x^2 e^x} + \frac{2xe^x}{x^2 e^x} \quad \text{simplificamos}$$

$$y' = 1 + \frac{2}{x}$$

$$(98) \ y = \frac{e^x - 1}{e^x + 1} \quad \text{aplicamos (8)}$$

$$u = e^x - 1 \quad v = e^x + 1$$

$$\frac{du}{dx} = e^x \quad \frac{dv}{dx} = e^x \quad \text{suutituyendo se tiene.}$$

$$y' = \frac{(e^x + 1)e^x - (e^x - 1)e^x}{(e^x + 1)^2}$$

$$y' = \frac{e^{2x} + e^x - e^{2x} + e^x}{(e^x + 1)^2} \quad \text{simplificamos}$$

$$y' = \frac{2e^x}{(e^x + 1)^2}$$

$$(12) \ \frac{d}{dx}(\operatorname{senv}) = \operatorname{cosv} \frac{dv}{dx}$$

$$(13) \ \frac{d}{dx}(\operatorname{cosv}) = -\operatorname{senv} \frac{dv}{dx}$$

$$(14) \ \frac{d}{dx}(\operatorname{tanv}) = \operatorname{sec}^2 v \frac{dv}{dx}$$

$$(15) \ \frac{d}{dx}(\operatorname{cotv}) = -\operatorname{csc}^2 v \frac{dv}{dx}$$

$$(16) \ \frac{d}{dx}(\operatorname{secv}) = \operatorname{secv} \cdot \operatorname{tanv} \frac{dv}{dx}$$

$$(17) \ \frac{d}{dx}(\operatorname{cscv}) = -\operatorname{cscv} \cdot \operatorname{cotv} \frac{dv}{dx}$$

(99) $y = \operatorname{sen} x$ *aplicamos (12)*

$$y' = \cos x \frac{dx}{dx} \quad \text{aplicamos (2)}$$

$$y' = \cos x$$

(100) $y = \operatorname{sen} x^2$ *aplicamos (12)*

$$y' = \cos x^2 \frac{d}{dx}(x^2) \quad \text{aplicamos (5)}$$

$$y' = \cos x^2 (2x) \quad \text{ordenamos}$$

$$y' = 2x \cdot \cos x^2$$

(101) $y = \operatorname{sen} ax$ *aplicamos (12)*

$$y' = \cos ax \frac{d}{dx}(ax)$$

$$y' = \cos ax (a) \quad \text{ordenamos}$$

$$y' = a \cdot \cos ax$$

(102) $y = \operatorname{sen} \frac{x}{b}$ *aplicamos (12)*

$$y' = \cos \frac{x}{b} \frac{d}{dx}\left(\frac{x}{b}\right)$$

$$y' = \cos \frac{x}{b} \left(\frac{1}{b}\right) \quad \text{ordenamos}$$

$$y' = \frac{1}{b} \cdot \cos \frac{x}{b}$$

(103) $y = \operatorname{sen} 8x$ *aplicamos (12)*

$$y' = \cos 8x \frac{d}{dx}(8x)$$

$$y' = \cos 8x (8) \quad \text{ordenamos}$$

$$y' = 8 \cdot \cos 8x$$

$$(104) \ y = 4 \cdot \text{sen } 4x$$

$$y' = \frac{d}{dx}(4 \cdot \text{sen } 4x) \quad \text{aplicamos (3)}$$

$$y' = 4 \frac{d}{dx}(\text{sen } 4x) \quad \text{aplicamos (12)}$$

$$y' = 4 \cdot \cos 4x \frac{d}{dx}(4x)$$

$$y' = 4 \cdot \cos 4x(4)$$

$$y' = 16 \cdot \cos 4x$$

$$(105) \ y = \text{sen } \frac{2}{x} \quad \text{aplicamos (II)}$$

$$y' = \text{sen } 2x^{-1} \quad \text{aplicamos (12)}$$

$$y' = \cos 2x^{-1} \frac{d}{dx}(2x^{-1})$$

$$y' = \cos 2x^{-1} (-2x^{-1}) \quad \text{aplicamos (II)}$$

$$y' = -\frac{2\cos\left(\frac{2}{x}\right)}{x^2}$$

$$(106) \ y = \cos x \quad \text{aplicamos (13)}$$

$$y' = -\text{sen } x \frac{dx}{dx} \quad \text{aplicamos (2)}$$

$$y' = -\text{sen } x$$

$$(107) \ y = \cos ax \quad \text{aplicamos (13)}$$

$$y' = -\text{sen } ax \frac{d}{dx}(ax)$$

$$y' = -a \cdot \text{sen } ax$$

$$(108) \ y = 4 \cdot \cos \frac{1}{2}x$$

$$y' = \frac{d}{dx}\left(4 \cdot \cos \frac{1}{2}x\right) \quad \text{aplicamos (3)}$$

$$y' = 4 \frac{d}{dx}\left(\cos \frac{1}{2}x\right) \quad \text{aplicamos (13)}$$

$$y' = 4 \left[-\text{sen } \frac{1}{2}x \frac{d}{dx}\left(\frac{1}{2}x\right) \right]$$

$$y' = 4 \left(-\text{sen } \frac{1}{2}x \cdot \frac{1}{2} \right)$$

$$y' = -2 \cdot \text{sen } \frac{1}{2}x$$

$$(109) \ y = \cos(x^2 + 1)^2 \quad \text{aplicamos (13)}$$

$$y' = -\operatorname{sen}(x^2 + 1)^2 \frac{d}{dx}(x^2 + 1)^2 \quad \text{aplicamos (6)}$$

$$y' = -\operatorname{sen}(x^2 + 1)^2 2(x^2 + 1)(2x)$$

$$y' = -4x(x^2 + 1)\operatorname{sen}(x^2 + 1)^2$$

$$(110) \ y = \frac{\cos x}{x} \quad \text{aplicamos (8)}$$

$$u = \cos x \quad v = x$$

$$\frac{du}{dx} = -\operatorname{sen} x \quad \frac{dv}{dx} = 1$$

$$y' = \frac{x(-\operatorname{sen} x) - \cos x(1)}{x^2}$$

$$y' = \frac{-x \cdot \operatorname{sen} x - \cos x}{x^2}$$

$$(111) \ y = \operatorname{sen}(\ln x) + \cos(\ln x) \quad \text{aplicamos (12) y (13)}$$

$$y' = \cos(\ln x) \frac{d}{dx}(\ln x) - \operatorname{sen}(\ln x) \frac{d}{dx}(\ln x) \quad \text{aplicamos (9)}$$

$$y' = \frac{\cos(\ln x)}{x} - \frac{\operatorname{sen}(\ln x)}{x}$$

$$(112) \ y = \operatorname{sen}^2 x + \cos^2 x$$

$$y' = (\operatorname{sen} x)^2 + (\cos x)^2 \quad \text{aplicamos (6)}$$

$$y' = 2(\operatorname{sen} x) \frac{d}{dx}(\operatorname{sen} x) + 2(\cos x) \frac{d}{dx}(\cos x) \quad \text{aplicamos (12) y (13)}$$

$$y' = 2\operatorname{sen} x \cos x - 2\operatorname{sen} x \cos x$$

$$(113) \ y = e^{\operatorname{sen} x} \quad \text{aplicamos (11)}$$

$$y' = e^{\operatorname{sen} x} \frac{d}{dx}(\operatorname{sen} x) \quad \text{aplicamos (12)}$$

$$y' = e^{\operatorname{sen} x}(\cos x) \quad \text{ordenamos}$$

$$y' = \cos x \cdot e^{\operatorname{sen} x}$$

$$(114) \ y = x \cdot \cos x \quad \text{aplicamos (6)}$$

$$y' = x \frac{d}{dx}(\cos x) + \cos x \frac{d}{dx}(x) \quad \text{aplicamos (13) y (2)}$$

$$y' = -x \cdot \operatorname{sen} x + \cos x \quad \text{ordenamos}$$

$$y' = \cos x - x \cdot \operatorname{sen} x$$

$$(115) \ y = \operatorname{sen} 2x \cdot \cos x \quad \text{aplicamos (6)}$$

$$y' = \operatorname{sen} 2x \frac{d}{dx}(\cos x) + \cos x \frac{d}{dx}(\operatorname{sen} 2x) \quad \text{aplicamos (13) y (12)}$$

$$y' = \operatorname{sen} 2x(-\operatorname{sen} x) + \cos x \cdot \cos 2x(2)$$

$$y' = -\operatorname{sen} 2x \cdot \operatorname{sen} x + 2\cos 2x \cdot \cos x$$

$$y' = 2\cos 2x \cdot \cos x - \operatorname{sen} 2x \cdot \operatorname{sen} x$$

$$(116) \ y = e^x \cos x \quad \text{aplicamos (6)}$$

$$y' = e^x \frac{d}{dx}(\cos x) + \cos x \frac{d}{dx}(e^x) \quad \text{aplicamos (13) y (11)}$$

$$y' = e^x \operatorname{sen} x + \cos x \cdot e^x \quad \text{ordenamos}$$

$$y' = \cos x \cdot e^x - \operatorname{sen} x \cdot e^x \quad \text{factorizamos } e^x$$

$$y' = e^x(\cos x - \operatorname{sen} x)$$

$$(117) \ y = \sqrt{\cos 2x} \quad \text{aplicamos el convenio}$$

$$y' = (\cos 2x)^{1/2} \quad \text{aplicamos (6)}$$

$$y' = \frac{1}{2}(\cos 2x)^{1/2} \frac{d}{dx}(\cos 2x) \quad \text{aplicamos (13)}$$

$$y' = \frac{1}{2}(\cos 2x)^{1/2}(-\operatorname{sen} 2x) \cdot 2 \quad \text{aplicamos (II)}$$

$$y' = \frac{\operatorname{sen} 2x}{(\cos 2x)^{1/2}} \quad \text{aplicamos el convenio.}$$

$$y' = -\frac{\operatorname{sen} 2x}{\sqrt{\cos 2x}}$$

$$(118) \ y = \tan x \quad \text{aplicamos (14)}$$

$$y' = \sec^2 x \frac{dx}{dx} \quad \text{aplicamos (2)}$$

$$y' = \sec^2 x$$

$$(119) \ y = \tan 5x \quad \text{aplicamos (14)}$$

$$y' = \sec^2 5x \frac{d}{dx}(5x) \quad \text{aplicamos (2)}$$

$$y' = 5\sec^2 5x$$

$$(120) \ y = \tan(ax + b) \quad \text{aplicamos (14)}$$

$$y' = \sec^2(ax + b) \frac{d}{dx}(ax + b)$$

$$y' = \sec^2(ax + b)(a)$$

$$y' = a \cdot \sec^2(ax + b)$$

$$(121) \ y = \tan^2(3x - 2)$$

$$y = [\tan(3x - 2)]^2 \quad \text{aplicamos (6)}$$

$$y' = 2[\tan(3x - 2)] \frac{d}{dx} \tan(3x - 2) \quad \text{aplicamos (14)}$$

$$y' = 2[\tan(3x - 2)] \sec^2(3x - 2)(3)$$

$$y' = 6\tan(3x - 2)\sec^2(3x - 2)$$

$$(122) \ y = \sqrt[3]{\tan 3x} \quad \text{aplicamos el convenio.}$$

$$y = (\tan 3x)^{1/3} \quad \text{aplicamos (6)}$$

$$y' = \frac{1}{3}(\tan 3x)^{-2/3} \frac{d}{dx}(\tan 3x) \quad \text{aplicamos (14)}$$

$$y' = \frac{1}{3}(\tan 3x)^{-2/3} \sec^2 3x(3) \quad \text{aplicamos (II)}$$

$$y' = \frac{\sec^2 3x}{(\tan 3x)^{2/3}}$$

$$(123) \ y = \ln\left(\tan \frac{x}{2}\right) \quad \text{aplicamos (9)}$$

$$y' = \frac{1}{\tan \frac{x}{2}} \frac{d}{dx}\left(\tan \frac{x}{2}\right) \quad \text{aplicamos (14)}$$

$$y' = \frac{1}{\tan \frac{x}{2}} \sec^2 \frac{x}{2} \left(\frac{1}{2}\right) \quad \text{aplicamos (X)}$$

$$y' = \frac{1}{2} \cot \frac{x}{2} \sec^2 \frac{x}{2}$$

$$(124) \ y = \frac{1}{3}\tan^3 x - \tan x + x$$

$$y = \frac{1}{3}(\tan x)^3 - \tan x + x \quad \text{aplicamos (6), (14) y (2)}$$

$$y' = \frac{3}{3}(\tan x)^2 \frac{d}{dx}(\tan x) - \sec^2 x + 1 \quad \text{aplicamos (14)}$$

$$y' = \tan^2 x \cdot \sec^2 x - \sec^2 x + 1 \quad \text{para simplificar empleamos la formula}$$

$$1 + \tan^2 x = \sec^2 x \quad \text{por consiguiente}$$

$$y' = \tan^2 x(1 + \tan^2 x) - (1 + \tan^2 x) + 1$$

$$y' = \tan^2 x + \tan^4 x - 1 - \tan^2 x + 1$$

$$y' = \tan^4 x$$

$$(125) \ y = e^{\tan x} \quad \text{aplicamos (11)}$$

$$y = e^{\tan x} \frac{d}{dx}(\tan x) \quad \text{aplicamos (14)}$$

$$y' = e^{\tan x} \sec^2 x$$

$$(126) \ y = \tan(\ln x) \quad \text{aplicamos (14)}$$

$$y = \sec^2(\ln x) \frac{d}{dx}(\ln x) \quad \text{aplicamos (9)}$$

$$y' = \frac{\sec^2(\ln x)}{x}$$

$$(127) \ y = \cot x \quad \text{aplicamos (15)}$$

$$y = \csc^2 x \frac{dx}{dx} \quad \text{aplicamos (2)}$$

$$y' = -\csc^2 x$$

$$(128) \ y = \cot x^n \quad \text{aplicamos (15)}$$

$$y = \csc^2 x^n \frac{d}{dx}(x^n) \quad \text{aplicamos (5)}$$

$$y' = -\csc^2 x^n (nx^{n-1})$$

$$y' = nx^{n-1} \csc^2 x^n$$

$$(129) \ y = \cot\sqrt{x} \qquad \text{aplicamos el convenio.}$$

$$y = \cot x^{1/2} \qquad \text{aplicamos (15)}$$

$$y' = -\csc^2 x^{1/2} \frac{d}{dx}(x^{1/2}) \qquad \text{aplicamos (5)}$$

$$y' = -\csc^2 x^{1/2} \left(\frac{1}{2}x^{1/2}\right) \qquad \text{aplicamos (II)}$$

$$y' = \frac{-\csc^2 x^{1/2}}{2x^{1/2}} \qquad \text{aplicamos el convenio.}$$

$$y' = \frac{\csc^2 \sqrt{x}}{2\sqrt{x}}$$

$$(130) \ y = \cot(1 - 4x^3) \qquad \text{aplicamos (15)}$$

$$y = \cot x^{1/2} \qquad \text{aplicamos (15)}$$

$$y' = -\csc^2(1 - 4x^3) \frac{d}{dx}(1 - 4x^3)$$

$$y' = -\csc^2(1 - 4x^3)(-12x^2)$$

$$y' = 12x^2 \csc^2(1 - 4x^3)$$

$$(131) \ y = (x \cdot \cot x)^2 \qquad \text{aplicamos (6)}$$

$$y' = 2(x \cot x) \frac{d}{dx}(x \cdot \cot x) \qquad \text{aplicamos (7)}$$

$$y' = 2(x \cot x) \left[x \frac{d}{dx}(\cot x) + \cot x \frac{dx}{dx} \right] \text{ aplicamos (15) y (2)}$$

$$y' = 2x \cdot \cot x (-x \csc^2 x + \cot x)$$

$$y' = 2x \cdot \cot x (\cot x - x \csc^2 x)$$

$$(132) \ y = \cot^2 5x$$

$$y = (\cot 5x)^2 \qquad \text{aplicamos (6)}$$

$$y' = 2(\cot 5x) \frac{d}{dx}(\cot 5x) \qquad \text{aplicamos (15)}$$

$$y' = 2\cot 5x \left[-\csc^2 5x \frac{d}{dx}(5x) \right]$$

$$y' = 2\cot 5x (-5 \csc^2 5x)$$

$$y' = -10\cot 5x \cdot \csc^2 5x$$

$$(133) \ y = \sqrt{\cot x} \quad \text{aplicamos el convenio.}$$

$$y = (\cot x)^{1/2} \quad \text{aplicamos (6)}$$

$$y' = \frac{1}{2}(\cot x)^{-1/2} \frac{d}{dx}(\cot x) \quad \text{aplicamos (15)}$$

$$y' = \frac{1}{2}(\cot x)^{-1/2}(-\csc^2 x) \quad \text{aplicamos (II)}$$

$$y' = \frac{\csc^2 x}{2(\cot x)^{1/2}} \quad \text{aplicamos el convenio.}$$

$$y' = \frac{\csc^2 x}{2\sqrt{\cot x}}$$

$$(134) \ y = \sec x \quad \text{aplicamos (16)}$$

$$y = \sec x \cdot \tan x \frac{dx}{dx} \quad \text{aplicamos (2)}$$

$$y' = \sec x \cdot \tan x$$

$$(135) \ y = \sec x^3 \quad \text{aplicamos (16)}$$

$$y' = \sec x^3 \tan x^3 \frac{dx}{dx}(x^3) \quad \text{aplicamos (2)}$$

$$y' = \sec x^3 \tan x^3 (3x^2) \quad \text{ordenamos}$$

$$y' = 3x^2 \sec x^3 \tan x^3$$

$$(136) \ y = \sec^3 \sqrt{x}$$

$$y = (\sec \sqrt{x})^3 \quad \text{aplicamos (6)}$$

$$y' = 3(\sec \sqrt{x})^2 \frac{d}{dx}(\sec \sqrt{x}) \quad \text{aplicamos (16)}$$

$$y' = 3(\sec \sqrt{x})^2 \sec \sqrt{x} \tan \sqrt{x} \frac{d}{dx}(\sqrt{x})$$

$$y' = \frac{3(\sec \sqrt{x})^2 \sec \sqrt{x} \tan \sqrt{x}}{2x^{1/2}}$$

$$y' = \frac{3(\sec \sqrt{x})^3 \tan \sqrt{x}}{2\sqrt{x}}$$

$$(137) \ y = \sec \frac{ax+b}{2} \quad \text{aplicamos (16)}$$

$$y = \sec \frac{ax+b}{2} \tan \frac{ax+b}{2} \frac{d}{dx} \left(\frac{ax+b}{2} \right)$$

$$y' = \frac{a}{2} \sec \frac{ax+b}{2} \tan \frac{ax+b}{2}$$

$$(138) \ y = \csc x \quad \text{aplicamos (17)}$$

$$y' = -\csc x \cdot \cot x \frac{dx}{dx} \quad \text{aplicamos (2)}$$

$$y' = -\csc x \cdot \cot x$$

$$(139) \ y = \csc \frac{x^3}{3} \quad \text{aplicamos (17)}$$

$$y' = -\csc \frac{x^3}{3} \cot \frac{x^3}{3} \frac{d}{dx} \left(\frac{x^3}{3} \right)$$

$$y' = -\csc \frac{x^3}{3} \cot \frac{x^3}{3} \left(\frac{3x^2}{3} \right)$$

$$y' = -x^2 \csc \frac{x^3}{3} \cot \frac{x^3}{3}$$

$$(140) \ y = a \cdot \csc bx$$

$$y' = \frac{d}{dx} (a \cdot \csc bx) \quad \text{aplicamos (3)}$$

$$y' = a \frac{d}{dx} (\csc bx) \quad \text{aplicamos (17)}$$

$$y' = a \left[-\csc bx \cdot \cot bx \frac{d}{dx} (bx) \right]$$

$$y' = -ab \cdot \csc bx \cdot \cot bx$$

$$(141) \ y = \csc \frac{3}{x} \quad \text{aplicamos (11)}$$

$$y' = \csc 3x^{-1} \quad \text{aplicamos (17)}$$

$$y' = -\csc 3x^{-1} \cot 3x^{-1} \frac{d}{dx} (3x^{-1})$$

$$y' = \frac{3}{x^2} \csc \frac{3}{x} \cot \frac{3}{x}$$

